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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

RAO, SHRINIVAS H

ART UNIT PAPER NUMBER

2814

DATE MAILED: 05/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/492,780

Applicant(s)

MATSUO ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 March 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1--11, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) 17-18 is/are allowed.
- 6) ☒ Claim(s) 12-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **Response to Amendment**

Applicants' amendment filed on March 19, 2002 has been entered on March 28, 2002.

Therefore claims 12, 16-18 as amended by the amendment and claims 13-15 as originally are currently pending in the application. ( claims 1-11, 19 and 20 are withdrawn from further consideration).

### **Claim Rejections - 35 USC § 112**

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 12 to 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 line s 6-7 recite, "a second insulating region formed between the first insulating region and occupied by an amorphous material". It is not clear between what regions the second insulating layer is formed. On one side the second insulating region seems to have the first insulating region and it is not clear what is on the second side of the second insulating region.

Claims 13-10 are rejected for at least depending from rejected claim 12.

Appropriate correction is required

### Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu ( U.S. Patent No. 5,962,904) and Wittmer Article ( Applicants' ids Wittmer ,M. et al. "Oxidation Kinetics of TiN thin films", J. App. Phys. Vol. 52 pp. 6659-6664 as previously applied, and further in view of Nakajima et al. ( U.S. Patent No. 5,907,188, herein after Nakajima) (previously applied to claims .17-18 only).

With respect to claim 12, to the extent understood, Hu and Wittmer describe substantially all the structure as claimed.( the previous office action incorporated herein by reference for the sake of brevity).

Hu and Wittmer do not specifically describe the limitation," Including a plurality of first insulating regions each of which is formed of a grain containing a metal oxide" .

However the Nakajima reference ( previously applied to claims 17 and 18 ) describes in figs. 31 A -I and col. 31 lines 3 to col. 32 line 50 describes a CMOSFET having a plurality of first insulating regions each of which is formed of a grain containing a metal oxide to from the CMOS devices.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Nakajima's plurality of first insulating regions each of which is formed of a grain containing a metal oxide in Hu and Wittmer's device to form a CMOS.device.

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The other added limitation, " a second insulating region formed between the first insulating region and occupied by an amorphous material" . ( Hu fig. 4 # 18, col. 5 line 55).

With respect to claim 16, in addition to the previous teachings of Hu and Wittmer, the newly added limitation, wherein the metal containing insulating film includes at least one surface which is covered with a covering insulating region made of amorphous insulating material. ( Hu fig.4 14 covered by 18).

***Allowable Subject Matter***

Claims 17 – 18 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitation of the dependent claims, in such manner that a rejection under 35 U.S.C. 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in independent claims, which include , " wherein the decrease of the Gibbs free energy at the time when a metal contained in the electrode forms an oxide is larger than that at the time when a metal contained in the first metal oxide insulating film forms an oxide, and the decrease of the Gibbs free energy at the time when a metal contained in the second metal oxide insulating film forms an oxide is larger than or equal to that at the time when the metal contained in the electrode forms an oxide."

***Response to Arguments***

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Applicant's arguments with respect to claims 12-16 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (703) 3065945. The examiner can normally be reached on 8.00 to 5.00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaudhuri Olik can be reached on (703)3062794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 7463926 for regular communications and (703) 872-9319 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 3067722.



Steven H. Rao

Patent Examiner

May 30, 2002



OLIK CHAUDHURI  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800